Amendments to the Drawings:

Attached is a new sheet of drawings, which includes new FIGS. 6 and 7. FIG. 6 is a flow diagram of a die bonding method as described in the original specification. FIG. 7 is a block diagram of a laser machining system as described in the original specification.

Remarks

Claims 25, 26, 28-42, and 49-52 are pending in the application, of which claims 25 and 40 are in independent form. Claims 25, 26, and 28-42 have been amended, claims 27 and 43-48 have been cancelled, and claims 49-52 have been added by this amendment.

Specification

The specification includes several changes.

After the paragraph beginning on page 5, line 1, of the original specification, new paragraphs have been added to provide a brief description of new drawing FIGS. 6 and 7.

The paragraph beginning on page 5, line 9, of the original specification has been amended to correct a typographical error and to provide a description of the parts of a laser machining system 700 of new drawing FIG. 7. Support for the new description corresponding to system 700 can be found throughout the original specification. For example, support for laser source 702 is found in the paragraph beginning on page 3, line 30, of the original specification, which describes laser source means. Support for laser scanner 704 is found in the original specification on page 3, line 30, to page 4, line 3; page 5, lines 22-28; and page 6, lines 5-6. These portions of the specification describe laser beam scanning means and laser scanning operation. Support for laser controller 706 is found in the original specification in the paragraph beginning on page 3, line 30, and in the paragraph beginning on page 5, line 14. These paragraphs describe control means and controlling machining parameters. Support for memory 708 is found in the paragraph beginning on page 4, line 4, of the original specification, which describes memory means.

The paragraph beginning on page 6, line 5, of the original specification has been amended to associate the translation table with laser scanner 704 of new drawing FIG. 7.

The paragraph beginning on page 6, line 26, of the original specification has been amended to add reference numbers corresponding to new drawing FIG. 6.

Drawings

The drawings were objected to under 37 C.F.R. § 1.83(a) for failing to show the "picking and placing . . . to the die pad," "a second adhesive," and the apparatus claimed

in claim 40. The "picking and placing" step and the "second adhesive" have been cancelled from the claims. Moreover, new drawing FIGS. 6 and 7 have been added in which FIG. 6 is a flow diagram of a die bonding method 600 and FIG. 7 is a block diagram of a laser machining system 700. Examples of the elements of the die bonding apparatus of claim 40 are shown in FIG. 7, which depicts a laser source 702, a laser scanner 704, a laser controller 706, and memory 708. Support for new drawing FIGS. 6 and 7 can be found throughout the original specification including page 1, line 27, to page 2, line 4; page 3, line 20, to page 4, line 7; page 5, lines 14-28; page 6, lines 5-6; and page 6, line 26, to page 7, line 2.

New Claims 49-52

New claims 49-52, which depend either directly or indirectly from claim 25, have been added by this amendment. Support for new claims 49-52 can be found throughout the original specification including page 5, line 22, to page 6, line 4, and original claim 26.

Claim Rejections – 35 U.S.C. § 112

Claims 26, 29, and 38 stand rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement in connection with certain aspects of the "second adhesive." The "second adhesive" has been deleted from the claims rendering this rejection moot. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 25 and 40 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to specify which adhesive is being acted on in certain steps. Claims 25 and 40 have been amended to delete the "second adhesive" and to refer to "an adhesive layer" that is laser machined to form "an attached singulated adhesive layer." Applicant believes that the amended claims overcome this rejection and requests that it be withdrawn.

The final Office action notes that claims 25, 26, 39, and 40 lack antecedent basis for the phrase "adhesive layer." Claims 25, 26, 39, and 40 have been amended to correct these antecedent basis issues.

Claim Rejections – 35 U.S.C. § 103

Claims 25, 26, 28-30, 33, 37, and 39-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,110,388 to Komiyama et al. ("Komiyama") in view of Japanese Patent No. JP02002343747 to Izumi et al. ("Izumi") and U.S. Patent No. 5,762,744 to Shibata et al. ("Shibata"). Claims 31 and 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Shibata and U.S. Patent No. 5,597,767 to Mignardi et al. ("Mignardi"). Claims 34-36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Shibata and U.S. Patent No. 6,472,295 to Morris et al. ("Morris"). Claim 38 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Morris and U.S. Patent No. 5,641,714 to Yamanaka ("Yamanaka"). Independent claims 25 and 40 have been amended to overcome these obviousness rejections. Withdrawal of these rejections is requested in light of the claim amendments and following remarks.

Komiyama

Komiyama describes die bonding of semiconductor chips using a photo-curable adhesive tape having a base sheet and an adhesive layer. *See Komiyama*, col. 2, lines 53-56. Komiyama describes that the adhesive layer is applied to a semiconductor wafer, and then the wafer and all or some of the adhesive layer is diced using a saw to form chips. *See id.* at col. 6, lines 4-13. Komiyama makes no mention of laser machining.

Izumi

Izumi describes laser dicing a workpiece that includes a semiconductor wafer adhered to a dicing sheet. *See Izumi*, paragraph **[0027]**. The dicing sheet includes an adhesive layer, an intermediate layer, and a support sheet. *See id.* at paragraph **[0028]**. Izumi describes that laser beams cut the semiconductor wafer, the adhesive layer, and the intermediate layer but not the support sheet. *See id.*

Shibata

Shibata describes a dicing process using expand tape. *See Shibata*, col. 2, lines 14-15. A wafer is adhered to a preform layer of the expand tape, and then the wafer and the

preform layer are cut using a dicing saw to form chips. *See id.* at col. 2, lines 15-21. Shibata makes no mention of laser machining.

Claim 25

Claim 25 is directed to a method of die bonding in which a structure is provided that includes "a wafer substrate separated from a carrier base by an adhesive layer positioned between the carrier base and the wafer substrate." Claim 25 recites in pertinent part:

> laser machining through the wafer substrate and the adhesive layer to form a singulated die with an attached singulated adhesive layer, the laser machining including controlling machining parameters of a laser beam in which a **first laser machining profile** is used to cut through the wafer substrate and a **second laser machining profile** is used to cut through the adhesive layer.

In contrast, Komiyama, Izumi, and Shibata, either alone or in combination, fail to describe all the features of claim 25. As acknowledged on page 6 of the final Office action, Komiyama fails to describe laser machining. This is also true of Shibata. Because Komiyama and Shibata fail to disclose laser machining, they also fail to disclose "controlling machining parameters of a laser beam in which a first laser machining profile is used to cut through the wafer substrate and a second laser machining profile is used to cut through the adhesive layer," as recited in amended claim 25.

Izumi describes dicing with laser beams, but fails to describe "controlling machining parameters of a laser beam in which a first laser machining profile is used to cut through the wafer substrate and a second laser machining profile is used to cut through the adhesive layer." At best, Izumi describes controlling a focal position of a laser beam to avoid a curved cutting plane along the wall of a slot cut by the laser. *See Izumi* at paragraph **[0022]**. However, Izumi makes no mention of using "a first laser machining profile . . . to cut through the wafer substrate" and using "a second laser machining profile . . . to cut through the adhesive layer."

Accordingly, because Komiyama, Izumi, and Shibata, either alone or in combination, fail to disclose all the features of claim 25, Applicant requests that the rejection of claim 25 be withdrawn.

Moreover, claims 26 and 28-39, which depend from and perforce incorporate the features of claim 25, are also allowable for the reasons discussed above with reference to claim 25. Applicant submits that certain dependent claims add further features not found in the cited references.

Claim 40

Claim 40 is directed to a die bonding apparatus and recites in pertinent part:

> a laser controller . . . and a memory for storing laser machining profiles used by the laser controller for controlling the laser beam to cut through the wafer substrate and the adhesive layer to thereby form the singulated die and the attached singulated adhesive layer, the laser machining profiles including a **first laser machining profile** used to cut through the wafer substrate and a **second laser machining profile** used to cut through the adhesive layer.

In contrast, Komiyama, Izumi, and Shibata, either alone or in combination, fail to describe all the features of claim 40. For example, Komiyama and Shibata fail to describe machining with a laser, "a laser controller," and "a memory for storing laser machining profiles" as described in amended claim 40.

Moreover, although Izumi describes dicing with laser beams, Izumi fails to describe "a memory for storing laser machining profiles used by the laser controller." Izumi provides a comparative example in which specific operating conditions of a laser are listed. *See Izumi* at paragraph **[0022]**. However, Izumi fails to mention "a memory" or "storing laser machining profiles used by the laser controller." Furthermore, Izumi fails to describe or suggest "a memory for storing laser machining profiles . . . the laser machining profiles including a **first laser machining profile** used to cut through the wafer substrate and a **second laser machining profile** used to cut through the adhesive layer."

Accordingly, because Komiyama, Izumi, and Shibata, either alone or in combination, fail to disclose all the features of claim 40, Applicant requests that the rejection of claim 40 be withdrawn.

Moreover, claims 41 and 42, which depend from and perforce incorporate the features of claim 40, are also allowable for the reasons discussed above with reference to claim 40. Applicant submits that certain dependent claims add further features not found in the cited references.

Conclusion

Applicant believes its application is in condition for allowance and respectfully requests the same.

The Commissioner is hereby authorized to charge any ***additional*** fees which may be required in connection with filing of this paper, or credit overpayment, to Deposit Account No. 19-4455.

Respectfully submitted,

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Attachment: New Sheet of Drawings